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Carbon Monoxide Poisoning in Horses.

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(Presented to the Lancashire V.M.A.)

Mr. President and Gentlemen,—Before commencing to enumerate several cases of poisoning by carbon monoxide gas in horses, which occurred 12 years ago in Liverpool, I think a few remarks about this gas would not be out of place.

As you are all aware, carbon monoxide is an extremely poisonous gas, owing to the fact that when absorbed by the pulmonary mucosa (and absorption is very rapid) it passes into the blood stream in the form of a very stable compound, viz., carboxyhœmoglobin; this being much more stable than oxyhœmoglobin. This stability prevents oxygenation of the blood, with dire results.

Poisoning in an atmosphere containing over 3 per cent. carbon monoxide is almost instantaneous.

The proportion of carbon monoxide normally in the air is stated to be under 1 per cent. It is slightly heavier than air, is odourless, inflammable, and chemically neutral. It is formed in the incomplete combustion of carbon and is contained in water gas—to the extent of about 44 per cent., and in coal gas to the extent of about 23 per cent., to name two common gases. It is also formed in the explosion, with complete combustion, of fire damp in mines, and is therefore a constituent of choke damp.

I will not at this juncture attempt to go into the general effects of poisoning by carbon monoxide gas, nor into the *post-mortem* appearances, as I think it will be of more interest to you if I detail them as I actually noted them in the cases which came under my notice (nine in number).

With regard to the chemical diagnosis, the best test for carbon monoxide gas depends upon the character of the absorption spectrum of carbon monoxide blood which may be observed in a dilution of one of defibrinated blood in 1,000. This test may be applied to blood, *post-mortem*, or used for air by agitating the suspected sample with normal defibrinated blood of the above strength.

The absorption spectrum of carboxyhb. is similar to that of oxyhb., viz., two bands in the yellow, but displaced a little to the right. The difference between them lies in the fact that reducing agents, *e.g.*, ammonium sulphide, reduce oxyhb. with fusion of the two bands into one, larger and indistinctly outlined, whilst reduction does not alter the carbon monoxide spectrum.

The first case occurred on Thursday, November 4th, 1909. On this day, about noon, I was called to attend a horse belonging to a firm of corn merchants and millers, whose stables are about 100 yards from my surgery. The subject was a bay cart gelding about nine years old, and the history was that the driver who had had him out during the morning had brought him back with the report that he was very difficult to get along, that he seemed very dull and heavy, and that he had been off his food all morning. On examination his pulse was found to be 50, temperature 101, respirations slightly increased, mucous membranes very slightly injected. He was tried in my presence with a handful of provender. This he took into his mouth, apparently wishing to eat it, but after having masticated it slowly for a while he rejected it, being seemingly unable to swallow it. I examined his teeth and found them to be normal, and looked upon the case as one of commencing laryngitis, treating him accordingly.

On the next day (Friday) there was no change in his condition. He was still unable to swallow and did not attempt to drink. I had him brought out of his stall and walked about for a few minutes, which he did quite well. This was at 10 a.m. Two hours later, being quite close to the stable, I looked in again. He was then lying down quite comfortably, so I did not think it worth while to disturb him by getting him up. At 2-30 p.m., however, word was sent to me that he had got up and was shaking and trembling very much and seemed likely to fall. Upon arrival I found the animal standing with all his four feet bunched together under him (glued to ground). The respirations were very much increased, and he was perspiring excessively. His pulse was now 60, temperature 103, and mucous membranes highly injected. Here, I thought, was a case of metastatic laminitis. An attempt was made to back him out of the stall and take him to a loose box at the other end of the stable, as he seemed likely to go down again at any moment. But he had only gone a few yards with great difficulty—there being two men at each side of him and one at his head—when down he went. All attempts to raise him being unavailing, he was dragged into the nearest stall and made as comfortable as possible by means of sacks of sawdust placed under him. He gradually subsided into a semi-comatose condition, now and then fighting wildly with his two fore-feet, but making no attempt to get up. He died in about two or three hours.

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Post-mortem examination next morning revealed the blood to be of a lighter colour than normal (a bright red or cherry red). Upon opening into the abdomen no change was noticed from the normal. On opening into the thorax the lungs appeared quite healthy, except that the left was congested (hypostatic). A most striking lesion was discovered when the trachea was slit open. The interior was gangrenous throughout almost its whole extent. The pharynx and epiglottis were also gangrenous. The bronchi contained a frothy mucus, pointing to death by suffocation.

I will now proceed with what turned out to be case No. 2.

On the following day (Sunday) I was summoned to the stable to see another horse reported to have suddenly become unwell. Upon arrival I saw and examined an aged black cart horse in good condition. His pulse was 60 and intermittent, temperature 103·5, and mucous membranes almost a scarlet colour. Respirations were visibly increased, and the animal had a somewhat pained expression. There was a fœtid odour from both nostrils, but no discharge. He had eaten next to nothing that morning I was told. I told my client I had no hopes of his recovery, as he was suffering from gangrene of the lungs. However I had him put in a loose box, which was quite apart from the stable out of which he had come, and gave antiseptics, etc. On the next day (Monday) he was worse, all the symptoms of grangrenous pneumonia were aggravated. There was a vile stench from his nostrils, and he looked quite hopeless. I advised destruction, but the owner wished to keep him another day. He died on the next morning.

Post-mortem (and I am afraid I should not have troubled to make a *post-mortem* on this case had it not been for the fact that previous to his death other cases of sickness in the stable had occurred) revealed a bright red coloured blood, the muscles also being of a lighter colour than normal. The lungs were gangrenous, as also were, to my surprise, the trachea, epiglottis and pharynx. Particles of bran were found in the trachea, pointing to the fact that the muscles of the pharynx, for some reason or other, had become paralysed and allowed foodstuff to pass down the trachea.

I must now revert to Monday to deal with Case No. 3. On the afternoon of this day a six-year-old grey cart horse was brought home with a report from the carter very similar to that of the first case, although in this the symptoms were more accentuated. To use the carter's own words, he had been able to do nothing with the horse all day. He had been very sluggish, had eaten nothing, and had been rambling. Upon examination I found the pulse to be 50, temperature 101, respirations slightly increased and mucous membranes slightly injected. I had him walked a few yards, and he walked as though drunk. Seeing that his case was evidently related to the first, I tried him with a little damp bran to eat. He took this in his mouth and masticated it, though in a peculiar manner, inasmuch as there was no rotatory movement of the jaws, but just an up and down movement—a champing. Moreover, he was quite unable to swallow any of the bran and rejected it. He then had a violent paroxysm of coughing, scattering the bran he had taken into his mouth in all directions. I then tried him with half a bucketful of water. He went for this with avidity, and was seemingly drinking it, judging by the movements of his ears, etc. But at the end of about a minute, on looking into the bucket I was astonished to see that very little indeed of the contents had disappeared. On taking away the bucket he was again seized with a violent fit of coughing, the water he had taken being forcibly expelled through mouth and nostrils. Owing to his apparent inability to perform the act of deglutition, I deemed it inadvisable to administer any medicine by the mouth, and gave him a hypodermic injection of one grain physostigmine sulph. to empty the bowels. On the next day there was a change in his condition.

Three more horses became affected, however, on this day, bay, brown and black, and I have called them respectively cases 4, 5, and 6. They were all aged horses, No. 4 being nearly 20 years old. This animal was out working about a mile or so from the stable when the first symptoms manifested themselves. He was reported to have suddenly become unsteady, to have swayed in the shafts, and to have trembled and sweated profusely. He was, however, got home with difficulty, but as soon as he got to the stable down he went. All attempts to raise him were unavailing. He was in a comatose condition, and unlike the first case, he did not fight. Taking into consideration his age and other factors, and the seemingly utter hopelessness of his condition, it was thought advisable to destroy him.

Post-mortem appearances differed from the other two cases. The internal organs were engorged, the liver was fatty and patchy (old age). The blood vessels of the brain were congested. There was no visible lesion in the trachea or lungs, except that one of these was congested—hypostatic. The reason that there was no gangrene of lungs I ascribe to the fact that a sufficient length of time had not elapsed between the onset of symptoms and death to allow of the change taking place, nor had the animal even attempted to eat anything during this time.

Thus far no cause had been found to account for these mysterious symptoms. There were about twenty horses in the stable, and all were receiving exactly the same food.

On this Wednesday afternoon, however, whilst talking to the owner and trying to find some cause, he informed me that they had lately had a deal of trouble with their gas engine (continually stopping). I remember quite well his bemoaning the fact that everything was going wrong, both in the stable and in the warehouse. It appears that he only lately had installed a plant for making his own gas—water gas, I believe. This plant was situate in a passage at the back of the stable, or the side of it, between it and the warehouse. In this passage the team wagons stood in their turn (each wagon with its team

of horses, of course), whilst the wagons were being unloaded. The horses had their heads up, and directly opposite the plant, and only a few yards from it, the passage only being wide enough for one team wagon. My client mentioned that on the previous Monday (two days before) one of his men whilst working near the plant had complained of feeling dizzy, and had been observed to stagger slightly. Happening as it did on a Monday, I am afraid that very little attention was paid to this incident, and I believe the symptoms evinced by this man were rather hastily believed to be due to something else other than gas. However it did come about that there was a suspected leakage from this gas-generating plant, and poisoning from carbon monoxide gas was admitted as a probable cause of the trouble from this date.

A small quantity of blood was taken from the grey horse (3), and on examination by means of the spectroscope, the presence of carbon monoxide was detected (*i.e.*, the absorption spectrum was unchanged upon the addition of ammon. sulphide).

Experimental animals (rats and mice) were placed in cages near the plant, and kept there for a short while, and when their blood was examined it showed the presence of carbon monoxide.

Now, all the six horses that had been affected up to the present had been team wagon horses. They had, therefore, all been standing at one time or another in the passage wherein was situated the generating plant. Strict orders were now given that henceforth no animals were to be allowed to stand in the passage. Oxygen was administered to the three horses now affected, and they received gentle exercise. Intravenous injections of physostigmine were also administered, and they were fed per rectum.

On the next day (Thursday) two other horses became affected. These horses were respectively the chain horse and shaft horse of the same team wagon. These eight horses then comprised all the team wagon horses, and all of them had been standing in the passage in close proximity to the plant.

On the next day (Friday) the following was the state of affairs (five horses suffering). The grey horse (3) kept in much the same condition, he did not seem to get any worse, and seemed fairly bright, with but little variation in pulse and temperature, except that the pulse was intermittent.

The brown horse (5) was very drowsy and his pulse was also intermittent, whilst as regards the black horse (6) there was noticed in his case a well-marked trembling in the fore-limbs. He was shaky, but could hardly be described as laminitic. This animal got down on the evening of the same day and died in two or three hours. *Post-mortem* revealed gangrenous trachea, lungs, etc., and cherry red coloured blood.

Cases 7 and 8 remained in much the same condition, showing the general symptoms already described, especially a grogginess when walking. Pulse in both cases about 50 and intermittent.

On the next day (Saturday) the brown horse (5) got down, fought violently, and was destroyed. *Post-mortem* similar to last case.

On the Sunday there were thus three horses under treatment. They were all receiving oxygen and being fed per rectum. They were not receiving food or water in any other way. The grey horse was still able to be taken out for exercise, the others were too unsteady to be taken out. They were not markedly emaciated. The grey horse had developed a persistent cough, but despite this he kept remarkably bright, and was the only one that ever gave any signs of recovery. Thus they kept on until the following Tuesday, November 16th, when the bay horse (7) got down, fought madly, and died in about an hour. *Post-mortem* similar to last.

Now, I told you at the commencing of this paper that there were nine fatal cases, and I have also told you that only the teams were affected, so perhaps you will wonder how the case of the ninth or odd horse, arose. Well, this odd horse was a brown mare, which did not belong to the firm in question, but was merely stabled there. She was a well-bred six-year-old Clydesdale mare. She went out at about 10 a.m. and returned at about 4 p.m. (a very short day's work in those days). The mare had to be walked each day to her owner's warehouse (not half a mile away), where the wagon was kept, and it was ascertained later that the carter, in order to effect a short cut, would take her out and bring her back by means of the passage, when circumstances permitted, *i.e.*, when no wagons blocked the way. Strange to relate, this mare did not show any signs of ill-health until the Tuesday (November 16th). It is very probable that this man used the short cut more frequently now, seeing that there would always be a free passage that way. However, on this day, whilst being walked home to the stable she broke out into a sweat and fell down twice in the street. The carter did not continue his journey to the stable, but brought her straight to me, my place being on his way to the stable and only about 100 yards away. Upon examination I found her to have a bad pulse of 72, temperature 103, respirations much increased, and mucous membranes a bright red in colour. On being walked a few yards she showed distinct signs of acute laminitis. I immediately had the two fore shoes removed. I was, of course, suspicious of the case (although I fear not quite suspicious enough), and had her tried with a drink of water from a bucket. I noticed that she drank very slowly, but she certainly managed to swallow allright, nor did she cough afterwards. The carter told me she always drank very slowly and very little, and thus to a certain extent I was thrown off the scent. She was a mare that did very little work, was well fed; so here I thought was a clear case of laminitis. I put her in a loose box, poulticed feet, and gave her a dose of physic. This was given in the form of a drench. She took it perfectly well and did not cough in the slightest. Next day (Wednesday) she was much better on her feet, pulse and temperature were unchanged, also

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mucous membranes, but respirations not so markedly increased. Bowels had moved, light shoes were tacked on, and she was given gentle exercise. I tried her with a handful of long hay. She took it, masticated it, but then, much to my dismay, she was unable to swallow it, and rejected it—a saliva-sodden mass. I was now convinced that she was also suffering from the effects of carbon monoxide poisoning, and oxygen was administered, etc.

Next day (Thursday) she was again walking better, but that was the only good point about her. Pulse was 84, temperature 103·5. She showed signs of abdominal pain and had watery evacuations. Occasionally she would get down, but was able to rise quite easily. Hypodermic injections of morphia were administered. On Saturday she was much worse, pulse 96, temperature 103·5, and respirations very much increased, mucous membranes a bright red. She was now given up as hopeless and died on the following day.

Post-mortem examination revealed a similar condition of affairs as the other badly-affected cases, together with a slight gastro-enteritis.

Meanwhile the only two surviving cases were gradually proceeding from bad to worse, and were merely being kept alive. Strange to say, they showed but slight variations in pulse and temperature, the former hardly ever exceeding 50 (and intermittent) and the latter 101·5.

On the following Thursday (November 23rd) the black horse (8) got down, became delirious, and was destroyed.

Post-mortem similar to others described.

The grey horse (3) lingered on until Saturday (November 25th), when at about 10 a.m. he dropped dead without a moment's warning. This animal had lived the longest of any affected, he having shown the first symptoms of poisoning on November 9th, and had thus lived for 16 days afterwards.

On *post-mortem* examination he proved to be the worst affected of all, excepting, perhaps, the brown mare.

It is interesting to note that a certain grey mare, which had been fired and blistered on the coronet, and had been standing in the stable in proximity to some of the victims of the poisoning, during the whole of this period was not affected in the least, which seems to point to the fact that the gas had not made its way into the stable.

In conclusion, it is satisfactory to note that my client received compensation for the loss of all these horses from the firm who erected the plant.

DISCUSSION.

Mr. E. H. STENT, M.R.C.V.S., in opening the discussion, thanked Mr. Butters for coming forward and giving such an interesting paper. He would like Mr. Butters to say how the damage occurred, and whether, in his opinion, there was any danger from ordinary gas engine plants.

Mr. L. D. WHITEHEAD, F.R.C.V.S., thought it rather peculiar that the horses were so badly affected, and that the carters got off without any injurious effects. He would like to ask Mr. Butters whether any of the carters did suffer.

Mr. E. L. BUTTERS, M.R.C.V.S., in reply to Mr. Stent, said he was afraid he could not give him very much information about the engine, except that it was said to be leaking. There was an idea that the exhaust pipe had not been carried up high enough, but he thought it was generally put down to the fact that the plant had been leaking. Personally he did not think it could have been due to the exhaust pipe. Experimental animals (rats and mice) were placed in cages near to the plant, and when their blood was examined it showed the presence of carbon monoxide. No injurious effects appeared to have been felt by the carters.

Milk Conference Committee.

A meeting of the Milk Conference Committee, called by the National Clean Milk Society, was held on March 16th. Mr. W. Buckley presided. Bodies represented included Society of M.O.H.'s (Dr. Orr, Ealing); National League for Health, Maternity and Child Welfare (Dr. G. Moore); National Farmers' Union (Mr. Allen); British Dairy Farmers' Association (Colonel Barham); National Federation of Dairymen's Associations (Mr. Horner); Sanitary Inspectors' Association (Mr. Quinton); Women's Sanitary Inspectors' and Health Visitors' Association (Miss Hughesdon); and National Veterinary Medical Association (Professor G. H. Wooldridge).

It was decided that it was desirable to call a "National Milk Conference," and to invite other bodies to co-operate, such as the Ministry of Health, Ministry of Agriculture, R.A.S.E., Breed Societies, Municipal Officers' Association and County Council Officers' Association, Royal Sanitary Institute and Royal Institute of Public Health, etc.

The suggested approximate date was October, and venue London—City Guildhall if possible.

Suggested matters for discussion:—

(1) As especially affecting *Producers*:—Production of clean milk. Economies of production, as affecting breeds, feeding, and costs. Tuberculin tests. Cattle diseases affecting milk other than T.B.

(2) As especially affecting *Distributors*:—Railway carriage. Handling and distribution by Wholesalers and Retailers. Treatment of milk: pasteurization, electricity, etc. Cost of distribution.

(3) As especially affecting *Consumers*:—Care of milk in the home. Food value and suitability of raw, pasteurized, sterilized, condensed, and dried milk.

(4) *Of General Interest*:—Education and the dairy industry. Means of improving hygienic quality of milk supply. Effects of bacteria in milk (beneficent as well as malevolent).

Shell for the Poultry House.

Poultry-keepers have been troubled for a long time past by the high price of oyster shell, and many have looked about for some substitute that will supply their birds with the lime that is needed for the formation of egg shell. The best is the ground shell of the slipper limpet—a parasitic shell fish which haunts the oyster beds off the coast of Kent and Essex. The Ministry of Agriculture has a small factory on the island of West Mersea in the estuary of the Blackwater River in Essex, where the slipper limpet shell, finally divided into coarse, medium and fine varieties, is now ready for the poultry, keeper and can be supplied at the West Mersea Station. The lime content is equal to that of the best oyster shell.

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A LITTLE SLEEP.

At the conclusion of his address to the thirty-ninth annual meeting of the Association, the President, in making his appeal for sustained endeavour, quoted the following words :—" Yet a little sleep, a little slumber, a little folding of the hands to sleep, so shall thy poverty come as one that travelleth, and thy want as an armed man." Dr. Bradley's quotation was peculiarly apt, inasmuch as it so clearly depicted the slowly sapping influence of the often unnoticed fraction which is missing in the case of incomplete endeavour. It is the *little* omissions, the almost insignificant flaws in the builders' work which so frequently imperil the safety of the edifice.

These almost unseen flaws are infinitely more cruel in their effect than are gross faults, since the latter precipitate a crisis, while the former increase to an almost intolerable limit the burden which is put upon the rest of the structure. It is even so with our Association. The burden of a few willing workers, who are grateful to have the opportunity of relinquishing time which " for the sake of a better adjective we are compelled to qualify as leisure " for the sake of the profession, is increased a thousand times by the little, almost insignificant, omissions of others.

It is true that the numerical support is extremely gratifying. An increase of over eighty in membership during the first quarter of the year is distinctly good. A little more help in other directions would render the labours of the executive officers a truly pleasant pastime.

To give but two examples. An attempt is being made to increase the contents of the *Veterinary Record,* and no difficulty should be experienced, provided that the members will furnish the material. It is not necessary that lengthy articles should be contributed. These require the sacrifice of a considerable amount of time which many busy practitioners can ill afford. Everyone can, however, make time to jot down a few notes of interesting cases and fortunate or unfortunate experiences. It will be a calamity if sufficient material is not forthcoming to enable the continuance of the proposed increase in size of our only professional weekly. Again in the matter of subscriptions. Over six hundred members have so far failed to respond to the notices reminding them that subscriptions are overdue. This procrastination is, of course, unintentional, but it is one of the little omissions which add so much to the difficulties of the executive officers, increase the work of an already overburdened staff, and add to the expenses of the Association.

There are countless other ways in which members could exhibit a live *interest* and take an *active* part in the organisation and running of the " National." It is sustained endeavour, not on the part of one or two, but of all the members which will make the journal a credit to the Association and the Association a credit to themselves.

Abstracts and Reviews.

Live Stock Rearing on the Gold Coast.

This is a report on the present-day conditions of rearing live-stock in the Northern Territories of the Gold Coast ; measures by which the future of this industry might be improved are suggested.

It has been maintained (*R. A. E.*, B., vi., 97) that a thorough search would reveal tsetse-flies everywhere, but the author considers that there are areas in the Territories free from them, varying from 1 to 10 sq. miles in extent. *Glossina morsitans* is fairly common, and is an inland fly not seen in pure savannah districts, but occurring in the so-called savannah forest districts. *G. tachinoides* is very common, but is confined to the river system. During the rains it may be found alongside rivers with grassy banks, but is chiefly confined to rivers with banks covered with shrubs and small scrub. *G. palpalis* is comparatively rare, and is chiefly found on river banks covered with a dense undergrowth. Among the indigenous live-stock, outbreaks of trypanosomiasis with heavy mortality do not occur, but this is not the case among horses, especially imported animals. No appreciable harm seems to be caused to native stock in the fly areas, so that it would appear to have acquired a high degree of resistance.

The three types of trypanosomes in the Northern Territories are *Trypanosoma brucei* (*pecaudi*), *T. vivax* (*cazalboui*) and *T. congolense.* In horses the symptoms are nearly alike for all three, but infection due to *T. vivax* is not so severe as that caused by *T. brucei,* and most of the recoveries that do take place occur after *T. vivax* infection. In cattle *T. vivax* does not appear to do much harm, and no symptoms were observed. *T. brucei* is said to cause a sudden emaciation that lasts for a year, after which the health of the animal improves. *T. congolense* hitherto has only been found naturally in horses, but experimentally it is very fatal to sheep, goats and dogs.

Stomoxys spp. are met with wherever there is live-stock, the most common being *S. calcitrans,* which is confined to the villages, and, as a rule, does not follow cattle out to grass. In 1912 the author attributed the spread of trypanosomiasis

among horses at Accra to *Stomoxys* and *Lyperosia* found in the district (*R. A. E.*, B., ii., 48). Given a reservoir of infection, *Stomoxys* seems capable of maintaining an enzootic centre in an area. These flies also act as carriers of two worms, *Habronema microstoma* and *H. macrostoma*, found in the stomachs of horses and donkeys.

The common Hippoboscid is *Hippobosca maculata*, which is said to be capable of transmitting trypanosomiasis mechanically, like *Stomoxys*.

Many species of Tabanids occur and cause annoyance to cattle. They are also believed to maintain an enzootic centre of trypanosomiasis by mechanical transmission.

The following ticks occur in the Territories :—*Amblyomma splendidum*, fairly rare, found on cattle; not known to transmit disease. *A. variegatum*, common, found on cattle and sheep, to which, however, it does not appear to transmit any specific disease. *Margaropus* (*Boophilus*) *annulatus australis*, common, found on cattle, transmits redwater. *B. annulatus decoloratus*, very common, found on cattle, sheep and goats, conveys redwater and also, it is said, spirochaetosis in cattle. *Haemaphysalis leachi*, found on carnivora, especially dogs, rarely on cattle, sheep, goats and horses; transmits canine piroplasmosis. *Hyalomma aegypticum*, common, found on all domesticated animals, transmits bovine redwater. *Rhipicephalus sanguineas*, common, found on dogs, sheep and goats; transmits canine piroplasmosis. *R. simus*, common, found on cattle, and being a transmitter of African Coast fever, would become a serious factor should this disease be introduced.

The only method at present adopted for ridding the country of ticks is to burn the pastures at a certain time of the year, but this is unsatisfactory. Stunting of growth, decreased milk yield, and marked depreciation of the hides are the results of tick infestation.

The commonest forms of piroplasmosis of cattle in the Northern Territories are those due to *Piroplasma bigeminum*, *Theileria mutans*, and a third parasite, *Achromaticus* (*macfiei*) (*R. A. E.*, B., viii., 62). These parasites set up only benign affections, inasmuch as all calves become infected shortly after birth.

The horse is also said to be subject to infection with *Nuttallia equi*, producing a dangerous and frequently fatal anæmia. Up to the present time piroplasmosis has not been detected in sheep.

[Beal (W. P. B.). Report on Live Stock Industries of the Northern Territories, Gold Coast.—MS. Report, dated 27th May, 1920, 97 pp. + 7 appendices comprising 4 maps. (Abstract in *Trop. Vet. Bull., London*, ix., No. 1, 28th February, 1921, pp. 36-50.) Review of Applied Entomology.]

Medical History of the War.

The first volume of the Official Medical History of the War, which has been completed by Major-General Sir W. G. Macpherson, editor-in-chief, is being published by the Stationery Office at the price of £1 1s.

The series is so planned as eventually to comprise 12 volumes :—General History of the Medical Services (four volumes); Diseases of the War and the Medical Aspect of Aviation and Gas Warfare (two volumes); Surgery of the War (two volumes); Hygiene of the War (two volumes); Pathology and Medical Research during the War (one volume); Medical Statistics and Epidemiology of the War (one volume). The first volume is a record in narrative form of the medical services in the United Kingdom and in garrisons oversea, with an account of the medical services in the operations against the German colonies in West and South-West Africa and in Tsingtau.

As regards the operations in South-West Africa, it is stated that the mortality rate through enteric fever in the South African War, 1899-1902, was 38·8 per 1,000 average strength for the whole period 1899-1902, the annual ratio being 14·7. In the German-Herrero campaign the ratios were 46·5 and 16·3 respectively; while in the South-West African campaign, 1914-15, the ratios were 0·78 and 0·75 respectively.—*The Times*.

Parasites of Bacteria.

Dr. d'Herelle, of the Pasteur Institute in Paris, has recently produced a book in which he has set out in consecutive manner the opinions he has been developing during the last four or five years with regard to the existence of parasites of bacteria. He believes such living organisms exist, and that they are widespread in nature. He proposes to call them "bacteriophages." The property filtrates of organic matter possess of inducing lysis in a culture of bacteria is commonly known as the phenomenon of d'Herelle. But it was originally described by Twort in 1915, who gave an exact description of the phenomenon; he called it a disease of bacteria, and believed it to be due to an enzyme secreted by the bacterium. It was two years later that d'Herelle announced that in the filtrate of dysentery fæces he had discovered an invisible microbe capable of producing lysis of the dysentery bacillus (Shiga). Though there has been ample confirmation of d'Herelle's experiment, yet very few investigators are prepared to accept the explanation that the changes are due to an ultra-microscopic bacterial parasite. Kabeshima has shown that the substance d'Herelle believes to be living, and has called "bacteriophage," can withstand a temperature of 70° C., and that the white powder obtained by precipitating with acetone induced the same lysis; he concluded that he was dealing with a catalytic agent which was produced by the patient as a protective mechanism against infection; that this catalyst caused micro-organisms to produce autolytic ferments, and that these ferments acted as catalysers to other bacteria, so that the lytic action was carried on from one generation to another. Bordet observed the appearance of the so-called bacteriophage in the peritoneal exudate of a guinea-pig inoculated with *B. coli* intraperitoneally. The lysis produced could be carried on from one culture to another even when the clarified culture had been killed by heat. It might seem at first sight that to explain the phenomenon as due to ferment action would require us to assume the inheritance of acquired characteristics. To this objection the reply is made that if the external stimulus produced by the original lytic agent acted by exciting an intra-cellular autolytic mechanism, then such a tendency to rapid autolysis might be transmitted from one generation to another even after

the original exciting cause had ceased to act. D'Herelle considers that a more acceptable explanation may be given by postulating the presence of an infinitesimally small parasite of bacteria, which attacks bacteria in much the same way as the malaria plasmodium infests the red blood corpuscles and reproduces itself within them. His bacteriophage, he tells us, can only live in living bacteria; in them it multiplies rapidly, increasing its virulence meanwhile. It is a natural enemy of bacteria, illustrating the adage that ". . . little fleas have lesser fleas and so *ad infinitum*." The hesitation displayed by other scientific workers in accepting the bacteriophage theory d'Herelle likens to the incredulity with which the scientific world received Pasteur's explanation that fermentation is due to the action of living cells. Pasteur convinced the world by his simple, clean, clear-cut experiments, and we are more ready to change our views than were our forefathers, and this generation does not even seek a sign. D'Herelle would have no difficulty in making us all his disciples if he produced evidence as convincing as that advanced by his great fellow countryman. The subject deserves attention because of the practical questions involved. If we are dealing with ferments secreted by cells, then such lytic agents may be valuable allies in ridding the system of bacteria. If, on the other hand, the effects are produced by living ultra-microscopic parasites, then we are in the presence of an unexplored world of life, and perhaps a form of life different from any we have yet known.—*British Medical Journal.*

Clean Milk.

To guarantee the supply of clean, wholesome milk to large towns is a problem a vast amount of labour and legislation has hitherto not availed to solve. No permanent freedom from anxiety followed the institution of the 3 per cent. standard of fat, the institution of a penalty for adulteration, and the prohibition of preservatives. The hopes founded on this legislation were quickly dispelled by the reports of bacteriologists warning us of millions of bacteria per cubic centimetre, and presence of the colon bacillus in as little as a thousandth of a cubic centimetre. These organisms may not be dangerous in themselves, but are an index of contamination, and are responsible for the rapid souring of milk. Approximately 1 per cent. of milk is lost by souring, and the losses due to this cause, combined with the irregular supplies due to the unstable character of milk, produce, it is estimated, a total loss of about one-ninth of the monetary value of the milk supply. The work done in the National Institute for Research in Dairying at Reading encourages the belief that the present unsatisfactory conditions can be easily improved. The results, Dr. Stenhouse Williams considers, justify the statement that "the best produced commercial milk can maintain a bacteriological standard of less than 10,000 bacteria per cubic centimetre for at least twenty-four hours after milking, even under the conditions of cooling and transit which exist in the country at the present time." This 10,000 colony standard is the one adopted in America; in this country more latitude is allowed, and a count of 30,000 bacteria per cubic centimetre constitutes Grade A certified milk. This standard of purity can only be maintained if attention is paid to many important details. The milk churns should be cleaned out by the persons receiving the milk; if they are sent back dirty the difficulty of cleansing them after the milk has soured is greatly increased. The churns should be properly washed out and then steamed for three minutes—a procedure which has been found to yield satisfactory bacteriological tests. Dirty milk churns are responsible for a great deal of contamination of milk. It is held that in an up-to-date farm with special milking sheds, well-lighted and with abundant water supply, and if the co-operation of clean workers can be ensured, it is possible to produce milk of great purity. But Dr. Stenhouse Williams and his co-workers are to be congratulated on the convincing demonstration they have given that even on an average farm, with no special advantages as to surroundings, provided that the milker understands his business, and is provided with light, water, and steam, it is possible to produce milk of equal purity. The successful production of Grade A milk requires the co-operation of persons possessing a certain amount of technical knowledge of the precautions that should be observed in milking. The supply of this form of labour is very limited in this country at the present time. The experiments of the workers at Reading go to show that, provided the milk industry is in a position to supply Grade A milk to the consumer within twenty-four hours, no attempt need be made to keep the milk cool on the journey. Commercial milk of the bacteriological standard of Grade A will maintain its sweetness at room temperature for a period of over six days in the winter months and over three days in the summer. The two essential conditions for the supply of Grade A certified milk are: (1) the employment of intelligent milkers, working in milking sheds adequately lighted, with a good supply of water and steam; and (2) provision for the thorough cleansing and sterilisation of the milk churns before they are returned to the country. There are, of course, certain other conditions into which we are not called upon to go in this place—namely, that milkers themselves should be well housed, considerately treated, and properly paid.—*British Medical Journal.*

Clinical and Case Reports.

The Editor will be glad to receive from members and others contributions to this column of reports of interesting cases.

Veterinary Foot-and-Mouth Suspect.

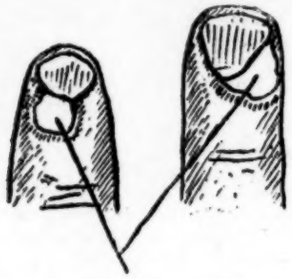
DIGITAL LESIONS.

By D. BUCHANAN, M.R.C.V.S., Ministry of Agriculture.

It may be of interest to your readers to know that I am at the present time prohibited from visiting stock on account of having contracted an affection of two fingers of the right hand, which has been medically certified to be suspicious of foot-and-mouth disease.

For the past few weeks I have been continuously examining affected cattle and sheep on infected premises, and at times have been too busy to be able to disinfect my hands for an hour or more after touching the lesions. Although he had never before seen a case of foot-and-mouth disease in the human subject, the medical officer of health for Kendal considered the lesions exhibited to be very suspicious of the disease, and advised treatment. When the vesicles were punctured by a doctor there exuded bright red arterial blood with no trace of purulent material whatever. Antiseptic treatment is being followed. A temperature of 98·8°F. was recorded about the time when the vesicles first began to form, and later slight pains in the right arm and in the right side of the neck were experienced. Otherwise I have been quite fit.

I may add that I have never been subject to poisoning from absorption by Jeyes' fluid, nor have I ever suffered from pyæmia or any other skin disease which might in the least resemble the present affection. Surrounding the vesicles was an inflammatory ring, the lesions appearing as follows:—



Vesicles with surrounding inflammatory ring. So far the vesicles have not responded to treatment and have re-formed, being now larger than they were originally.

Rupture of Both Gastrocnemii in a Cow.

By A. W. TURNER, Melbourne University Veterinary School.

Subject.—A half-bred shorthorn cow, aged four years.

History.—The animal was put in a truck with seven other cows to be sent by rail to Melbourne. On arriving at Melbourne, she was seen to be down, was unable to rise, and had to be pulled out of the truck on her side. After about an hour she managed to get up with some help, and was walked two miles. On the following day she was found on her knees grazing. That night she calved, and was found on the following morning in the plantigrade position, *i.e.*, her hind limbs, from the tuber calcis to the hoof, were in contact with the ground, and she was utterly incapable of extending the hock joint. About two hours were spent in efforts to sling her in the shafts of a dray, but without success. However, she was led into an ambulance, still "walking on her hocks," and brought to the Melbourne University Veterinary School.

State of Patient on Admission.—The plantigrade position was still maintained. She exhibited constant efforts at straining, and frequently passed small quantities of urine. Was able to move about slowly in her peculiar manner. There were no signs of general paralysis of the hind limbs, as she was quite capable of kicking on being milked; and she was further capable of using her tail.

There was a partial eversion of the vulva.

Examination per rectum showed that the bladder was moderately full and inclined posteriorly. When it was pushed forward, urine was voided easily. The difficulty in micturition and the partial eversion of the vulva could be explained by the backward pressure due to the weight of the abdominal contents, in the case of the bladder, giving a partial retroflexion, and consequently a kink in the urethra. Later in the day she rolled on to her side and maintained that position. Next day it was decided to shoot her.

Diagnosis.—From an experience of a similar case some years previously, Mr. E. F. J. Bordeaux, B.V.Sc., lecturer in charge of the clinic, put forward the diagnosis, namely, Rupture of both gastrocnemii muscles.

Post-mortem Examination.—The skin and superficial muscles were removed from each hind limb to expose the gastrocnemius muscle in its sheath of fascia. Up to this point nothing abnormal could be noticed, except in the case of the left limb, where a break in the continuity of the muscle could be palpated. On slitting the fascia, much blood-stained serum escaped, and a distinct rupture of the muscle about 3 inches from its origin could be seen. The transverse rupture led in about an inch, and then became a longitudinal pocket about 4 inches deep, filled with blood clot. It proceeded transversely about an inch again, and formed another deeper longitudinal pocket. The right limb showed similar lesions.

I have to thank Mr. E. F. J. Bordeaux, B.V.Sc., in whose clinic the case was seen, for permission to make this report.

Association Reports.

Midland Counties Veterinary Medical Association.

ANNUAL MEETING.

The annual meeting of the Midland Counties Veterinary Medical Association was held at the Grand Hotel, Birmingham, on Friday, February 17th, when the members present were:—Messrs. W. F. Aston, Ludlow; J. F. Banham, Stratford-on-Avon; Beaumont, Bishop's Castle; W. H. Brooke, Handsworth; F. Chambers, Wolverhampton; J. W. Conchie, Kidderminster; J. Cormack, Coventry; W. J. Dale, Coventry; H. J. Dawes, West Bromwich; H. W. Dawes, West Bromwich; Brennan De Vine, Birmingham; C. V. Dayus, Craven Arms; P. M. Evershed, Nottingham; L. W. Heelis, Solihull; R. P. Holmes, Birmingham; J. Howe, Birmingham; H. Tudor Hughes, Oswestry; A. Mackenzie, Market Drayton; James Martin, Wellington; H. L. Pemberton, Bridgnorth; J. Robertson, Stourbridge; M. Sadler, Burton-on-Trent; T. Slipper, Sutton Coldfield; L. C. Tipper, Birmingham; R. C. Trigger, Newcastle; W. G. Thompson, Stafford; W. White, Birmingham; S. M. Woodward, Birmingham; and John Young, Birmingham; with Mr. L. C. Maguire as a visitor. Apologies for absence were received from the President (Mr. H. S. Reynolds, Daventry); Dr. O. Charnock Bradley, Sir Gilbert Barling, Sir Stuart Stockman, Professor Hobday, Professor Macqueen, and Messrs. R. Aunas, G. Barber, T. J. Blain, J. B. Buxton, W. E. Blackwell, J. R. Carless, T. Chambers, J. Clarkson, H. S. Cockburn, A. J. Curtis, W. Dale, J. C. De Ville, T. H. Duckworth, H. Fairer, D. Forwell, E. Franklin, W. Gascoyne, W. W. Grasby, R. L. Green, E. Hall, C. S. Hunting, J. G. Hoban, T. Hobson, R. Hughes, R. Lake, G. H. Livesey, T. Ludlow, R. McGregor, R. Over, A. Over, A. W. Noel Pillers, C. J. Peach, R. L. Phillips, J. O. Powley, F. J. Prince, F. V. Steward, Trevor Spencer, W. Tart, F. B. O. Taylor, Hedley A. Tucker, and J. Whyte.

Meeting of the Council.

Prior to the general assembly a meeting of the Council was held, Mr. De Vine being elected to the chair in the absence of the President. It was resolved to recommend the election of the following officers :—President, Mr. De Vine ; Vice-Presidents, the retiring President (Mr. Reynolds), Mr. W. E. Ison and Mr. A. B. Forsyth ; Treasurer, Mr. Brooke ; Secretary, Mr. H. J. Dawes ; Auditors, Mr. F. L. Gooch and Mr. Trigger ; Council, Messrs. H. L. Pemberton, L. W. Heelis, J. Cormack, J. Martin, S. M. Woodward, J. O. Powley, T. Slipper, and R. Hughes, and the officers before mentioned. It was also decided to recommend that the next meeting be held in Birmingham, with discretionary power to the new President to change the place, and that the subject for discussion on that occasion be left to the annual meeting.

New Members.

Mr. De Vine was also chosen to preside over the annual meeting of the Association. The circular convening the meeting having been read by the Secretary (Mr. Dawes) and the minutes of the last meeting confirmed, Mr. L. C. Maguire was nominated for membership, and the following were elected as members :—Mr. F. G. Hoban, Whitchurch ; C. V. Dayus, Craven Arms ; E. Beaumont, Bishop's Castle ; and Arthur J. Curtis, Shrewsbury.

John Malcolm Memorial Fund.

In accordance with notice, the Secretary proposed that a sum of ten guineas be contributed by the Association to the John Malcolm Memorial Fund. He remarked that that fund needed little commendation to the members, and pointed out that all the money collected was being used entirely for the education of the three children whom their old friend left, two of whom had been placed in the Wolverhampton Orphanage, while the third was to be sent to a school. If Mr. Malcolm was not actually a pioneer in the formation of the Association, he did as much for it as any other member, being always ready to forward its interests. The profession had subscribed £300 to the fund, and the Committee charged with its administration were very thankful for such support.

Mr. Cormack seconded the motion, which was carried unanimously.

Returning thanks as Chairman of the Committee, Mr. Trigger said it was hoped to continue to assist the boys after they had completed their education, and to that end he appealed for further contributions to the fund. He also spoke of the encouraging progress which the oldest boy was making in his studies.

Candidates for Council of R.C.V.S.

Mr. R. Hughes wrote, stating that he had been asked to allow his name to be put forward as a candidate for election to the Council of the Royal College, and expressing the hope that he merited the support of the members of the Association. He promised, if elected, to study the best interests of the profession, and in particular the rights and privileges of the general practitioner, whom he regarded as the backbone of veterinary science, notwithstanding the prominence given to modern universities and officialism.

The Secretary said Mr. Hughes was one of the oldest members of the Association, and would make an excellent member of the Council.

Mr. Trigger agreed, and proposed that the Association express its pleasure at the fact that Mr. Hughes had become a candidate, and pledge its unofficial support.

Mr. Martin seconded as an old college chum of Mr. Hughes, and the motion was carried.

Mr. G. H. Livesey wrote, inviting the members to endorse his candidature in the same election, and the Chairman, observing that he would be a good representative of the general practitioner, urged those present to give him their votes.

Statement of Accounts.

As Treasurer, Mr. Brooke presented the annual statement of accounts, from which it appeared that members' subscriptions had amounted to £59 2s. 6d., and that, including a balance of £80 16s. 2d. brought forward from the previous year, their total receipts were £176 16s. 6d. The present bank balance was £134 0s. 6d., but from this had to be deducted £51 0s. 6d. for Secretary's and Treasurer's expenses in 1920 not yet drawn. Twenty-one members had not paid their subscriptions for the past year.

The balance sheet, which had been duly audited, was adopted on the proposition of the Chairman, seconded by Mr. Tipper.

Appointment of Officers.

The report of the Council meeting was read by the Secretary, who, in moving the election of Mr. De Vine as President for the ensuing year, referred to the large amount of work that gentleman had done for the Association. As one who had known him ever since he came to Birmingham, Mr. Dawes was proud of him as a friend, and was convinced that he would do credit to himself, the Association and the office.

Mr. Brooke, who seconded, said Mr. De Vine was nothing if not thorough, and was quite an acquisition to the Association.

Mr. Trigger, supporting the motion, said he regarded Mr. De Vine as a worthy successor to the late Mr. Malcolm.

The proposition was adopted with unanimity, and in acknowledging the honour the new President said he recognised that the position was a responsible one, and hoped he would have the full support of the members. A question of vital importance might arise at any time, and it was essential that the organisation should be maintained in full working order and the meetings regularly attended.

The other officers were elected as recommended by the Council, with the exception that Mr. Heelis

was made an Auditor in place of Mr. Trigger, who was chosen to fill the vacancy thus caused on the Council.

Mr. TUDOR HUGHES proposed a hearty vote of thanks to the officers for their services during the past year, and attributed to their conduct of affairs the fact that the Association was one of the happiest family circles in the country.

Mr. TIPPER seconded, and the resolution was carried with acclamation.

In reply, the SECRETARY assured the meeting that the greatest pleasure the officers could have was to know that the Association was maintaining its reputation as nearly the strongest organisation of its kind in the country in point of numbers, and as second to none in promoting the well-being of the profession.

Place and Subject for next meeting.—The Council's recommendation in regard to the venue of the next meeting was accepted, and the President and Secretary were asked to arrange, if possible, for a demonstration on fistulous withers, by Professor Reynolds.

Subscriptions.—In reply to Mr. CONCHIE, the SECRETARY explained that the subscription of two guineas for membership of the National Association was independent of the subscription to the Midland Association, which paid an affiliation fee of 1s. per subscribing member to the former and had a good return for the money. The Midland Association depended solely upon the annual subscription of 10s. per member, which was not increased during the war, and he thought no one could grumble at paying that sum.

CONTAGIOUS BOVINE ABORTION: A REVIEW.

Mr. TUDOR HUGHES then opened a discussion on "Bovine Contagious Abortion." He said—

The basis of this review is Professor J. T. Edwards's paper upon "Bovine Abortion and its Control," prepared for the National Veterinary Medical Association last year (1921). As you are aware, the discussion of this paper was remitted at the annual meeting at Chester to the branches of the N.V.M.A., and the discussions of the Northern and Southern Branches have been published in the *Veterinary Record*.

In the first place I think the veterinary profession is greatly indebted to Professor Edwards for his magnificently complete and comprehensive epitome of the vast amount of literature that has been published upon this disease, since Bang (Denmark) announced the discovery of the bacillus, named after him, in 1895, as being the causative factor of its incidence and spread. In the meantime, research in most countries has been prosecuted upon a colossal scale and the volume of literature published upon the subject has assumed stupendous proportions, but in spite of all this a cure is still unfound and, according to the author, likely to prove undiscoverable. This would appear to indicate a position of profound despair, but thanks to research conducted under the auspices and at the expense of the British Government, under the direction of Sir Stewart Stockman, a method of prevention by means of vaccination has been evolved.

Nomenclature.—It is to be regretted that upon the discovery of Bang's *bacillus abortus* the disease for which that organism is responsible was not forthwith named "Bang's Disease." Such a course would in all probability have saved a great deal of misunderstanding and have economised a great deal of effort in the field of research work, and to-day there might not be such opposing schools of thought regarding the etiology of contagious bovine abortion.

The other causal organisms that have been described are:—

(1) The *micrococcus* and short bacillus of Nocard. p. 498, W.L.L.
(2) The *paratyphoid bacillus* of Moussu.
(3) The *spirillum* of Theobald Smith and others. p. 511, „
(4) The *Vibrio* of McFadyean and Stockman. p. 511, „
(5) The "Omnibus" or "Multiple Infection" group of organisms. p. 513, „

By this term I refer to the etiological school of thought led by Professor W. L. Williams, of America, which maintains "that there is no limitation upon the number of species of micro-parasites which may cause abortion, no restriction upon the variety of lesions and results of lesions which the infection may cause, and no obligatory period of invasion or disappearance fixed for the infection." p. 513, „

"This conception offers many analogies to wound infection" in particular, as it is held and stated that "In every part of the genital tract micro-organisms are common throughout the life of the individual." . . . "Should conception occur, and the fertilized ovum descend into the uterus, it encounters the micro-organisms infesting the cavity. The embyro has acquired no power to resist invasion, with the result that bacterial activity is advanced. Then follows a definite metritis. As soon as the fœtal organs have developed, the infection passes through the chorion and amnion into the amniotic fluid and is swallowed by the fœtus. Accordingly, the bacteriologic findings of Hagan, Carpenter, and others . . . show parallel infection in the non-gravid uterus, in the utero-chorionic cavity of the pregnant uterus, and in the fœtal alimentary tract, and later when the calf is born the same bacteria are recoverable from its stomach and intestines. There is, then, a continuity of infection in the mother and the intra-uterine invasion of its fœtus. There is thus an endless infection-chain connecting the non-gravid uterus with abortion sterility, retained afterbirth, and calf scours and pneumonia." p. 513, „ p. 514, „ p. 513, „ p. 515, „

If this is a true picture of the reproductive process in the mammalia, in particular the cow, it seems marvellous that any are born alive, and if born alive, a wonder that they survive, and are able to carry on the species.

In a letter in the *Veterinary Record* of 19th November, 1921, the views held by this etiological school appear to be championed in this country by Captain Maguire, as the result of his studies, upon generative diseases, in Denmark. There, it appears, from the letter, that Bang's bacillus is now considered a secondary factor in the production of abortion. Capt. Maguire further states, "Normally there is no organ of the body that has a higher power of resistance to infection by pathogenic organisms than the non-gravid or gravid uterus." Vet. Record p. 931.

In diametrical opposition to the endless-chain of infection conception I may quote Prof. Edwards' statement in his reply to the discussion of the Northern Branch at Manchester:—"The non-pregnant and the pregnant uterus are sterile; if not, they are diseased. There is hardly a more delicate organ in the body than the uterus. What seems to be a peculiarity is that the Bang's bacillus will not produce any manifest signs of disease in an animal, except in the uterus. Ordinarily, the uterus is quite free from infection." Vet. Record p. 869.

The question of the delicacy of the uterus, especially the cow's, is one that we, as practitioners, may well pause to consider. In obstetric practice we know well that this organ may be ruptured by the hock, etc., of the calf, and so long as the rent is in the roof or upper part of the uterus, and of moderate size, the prognosis is not unfavourable in the majority of cases. Again, it is not an uncommon experience for this organ to be found everted and lying, perhaps, as is often the case, denuded of the afterbirth, covered with filth and ordure, upon the floor. Yet we take the trouble to cleanse and replace the organ and recovery is so frequently obtained as to make it worth while.

Abortion statistics.—In the first place one needs to distinguish between "outbreaks" and "cases" of

abortion, as there appears to be some confusion of thought in the matter. Naturally it is the "outbreaks" of abortion that are most likely to attract the attention of the investigator, and upon these, of course, he bases his statistics, whereas it is the practitioner who in the main meets with the "cases" of abortion, and as a good many of the latter may be due to accidental causes (*e.g.*, dealers' cattle), he may be somewhat sceptical in accepting the statistics of outbreaks.

As far as outbreaks are concerned, 90—99 per cent. are stated to be due to Bang's bacillus.

Sad to relate, the extent to which the herds of this country and other countries are affected with contagious abortion (Bang's Disease) has been found to be far in excess of what was ever conjectured or dreamt of when investigation was instituted and a Departmental Committee appointed.

In a recent communication received from the U.S.A. it is stated that 90 per cent. of their herds are affected with contagious abortion, and probably very much the same ratio prevails here.

Statistically and practically there is therefore every reason for considering all abortions in cows as contagious. Those that are not may be considered to be the exceptions to prove the rule.

Economic importance.—To-day this infection is regarded as causing greater losses to the cattle industry than any other disease, not excepting tuberculosis. The loss of the calf, and the interference with meat and milk production is not the only loss, perhaps the most subtle is the interference with herd efficiency as the result of the subsequent metritis and sterility which so often follow as sequelæ.

Infection.

Ingestion of contaminated food and water is practically the only important method by which the disease is spread. Infection by the genital tract and teat ducts has been suggested by a number of experimental workers.

The ingested organisms being taken up during the process of digestion by the lymphatic system, find their way through the circulation to the udder (the favourite *habitat*) and, of course, the uterus. If the cow is not pregnant the bacilli do not infect the uterus, but remain in the udder tissue, and from there find their way to the uterus when the animal has become pregnant. The infection once established in the udder may persist there for an indefinite period—proved continuously for up to seven years in the case of one cow—and yet no lesions are produced. There is, therefore, no clinical evidence as to a possibly infected cow available, until the act of abortion occurs, and one can quite readily concur in his view that there are many healthy carriers never showing signs of disease, as a cow though infected may deliver a live calf, or full-term calves may be affected *in utero*, or may be affected by the milk, but infection does not last long.

The greatest source of infection is the aborting cow, by means of the discharges from the womb, as well as the contaminated fœtus and fœtal membranes. The proper disposal of the latter deserves more attention than is frequently bestowed upon them. They should be burnt or buried with lime, if the latter, preferably in the garden or some place inaccessible to cattle. The organism remains in the uterus after parturition only about three weeks as a rule, but as a few isolated cases are on record of finding the infection as late as the fifty-first day, it is wise to keep the aborted animal from the bull for a period of at least two months. An aborting cow or heifer should certainly be isolated, and on no account allowed on the pastures until she has ceased to discharge, as the *B. abortus* has been proved to remain alive on pastures for a period of months. This suggests the query, "Is abortion spread more during the summer than the winter months?"

The Bull.

At one time, upon evidence of a clinical character, it was assumed that the bull played a *rôle* of considerable importance in spreading the infection of contagious abortion, but more recent research of an experimental character has served to convince investigators that the bull plays a very unimportant part, if any, in the dissemination of Bang's bacillus, so that the painstaking, if not painful, ablutionary procedure of the past appears to have been unnecessary—labour in vain, in short.

Indeed, so completely vindicated and reformed is the character of the bovine male, that it is now categorically stated that under no circumstances whatever should the bull be vaccinated. This statement appears to be based upon the view that the bull does not spread the infection, and that the introduction of the living vaccine may occasionally lead to such lesions of his genitalia as to render him unfruitful.

Transmissibility and Danger to Man and Woman.—This aspect of the question has been brought into fresh prominence by the recent publication of a paper by Mr. L. E. Bevan (*Veterinary Record*, 24th December, 1921), Government Veterinary Bacteriologist, of Southern Rhodesia, delivered at a joint meeting with the medical profession, before the S. Rhodesia Veterinary Association, "in view of the recent suggestion that the disease may be infective to man."

In the discussion that followed two doctors cited three cases of abortion occurring in women who had consumed the milk of aborting cows.

Considering that abortion amongst women is not what might be considered a rare phenomenon, and further that the conditions of the farmyard do not prevail in polite and civilized society, the matter is decidedly one that warrants further investigation, to determine whether or not the milk supply is at the root of the matter. On account of the exceedingly close microbiological identity between the organism of Malta fever in man and goats, and the *B. abortus* of Bang, it is suggested that aborting cows may be the means of spreading Malta fever in districts where that disease is prevalent (South of lat. 46°).

After-Effects of Contagious Abortion.

Of these, the most frequent and unpleasant is *retention of the after-birth*. This is a problem for which we still seek a satisfactory solution, and I hope that some members of this Association can give us some good tips from their long accumulated fund of experience. The lines of treatment for this complication generally adopted comprise:—(1) Cleansing drenches (ergot, mugwort, salines, etc.); (2) Manual removal; (3) Irrigation; (4) Pessaries.

With regard to *manual removal* I think that with ripening experience one tends to a gentler and less heroic attitude, realising that the puerperal uterus will tolerate neither forceful manipulation nor strong disinfectant solutions.

Again, what period after parturition presents the most favourable time for effecting the manual removal of a retained cleansing?

In the essay you will observe that Poulsen effected the removal of the afterbirth by hand within 24 hours of birth, and his experience certainly does provide a strikingly successful result, and one which has as its basis nothing more nor less than the ordinary surgical principles for the treatment of wounds. However, with regard to a cleansing which can be completely removed by hand, within 24 hours of birth, without injury to the uterus, does not experience incline us to the view that such a cleansing would spontaneously drop away a few hours later (especially if assisted by a cleansing drench)? Most practitioners, I believe, elect to undertake the operation on the second or third day, before the bones have gone up, and the *os uteri* closes.

Vet. Record p. 730.

Irrigation of the Uterus.—Diametrically opposed opinions are expressed upon this procedure, and the truth probably lies somewhere between the two extremes.

Pessaries.—These seem to be getting more popular every year, and are now being widely sold to farmers for use by themselves. Their use is advocated within 2 to 5 hours after birth or abortion.

Other after-effects represent chiefly progressive stages of the foregoing, with the exception of sterility, which will be mentioned later.

XUM

Medicinal Treatment.—Under this heading I do not intend to go further than to call your attention to an article in the *Veterinary Record* of 17th September, 1921, in which the successful treatment of Malta fever by colloidal silver preparations injected intravenously, and in relatively small doses (2 to 4 c.c. of 2% collargol solution) is placed on record by Zeller and others, with the suggestion that veterinary surgeons should systematically test out the method with contagious abortion. p. 751.

Vaccination and Control.

There is a common belief in the establishment of a natural immunity against abortion, and that after a cow has aborted once she is not so likely to abort again. Is this view, however, borne out in practice, especially as expressed in market values, *i.e.*, does an aborted animal command an enhanced price because she is on the way to becoming immune ?

Is it not rather the case that a cow as a rule aborts only once because she is given no further chance of doing so, being sold off either for beef if she has done well after aborting, or as a "screw" if complications have supervened and she has done badly ? This for the reason that there is no prospect of a profitable yield of milk or a live and healthy calf for another year, unless, of course, her value as a pedigree animal is such as to warrant her being kept on for another year as a speculation, or, in the case of a cow (as opposed to a heifer) one that is known to possess a good milking record.

Isolation Methods.—These may at first sight appear easily practicable and correspondingly tempting, but the causal organism (B. Bang) is so subtle in its spread, and the period of incubation of such duration, that the defensive measures adopted may be irretrievably broken down, and irreparable damage prove widely distributed, before one is aware of it. In any case such methods, to be really effectively carried out, are necessarily expensive, as they entail separate premises and separate attendants, and have to be controlled by the universal application of the agglutination test. Such methods, then, are strictly confined to pedigree stock of high value, in which abortion is not already widespread, and which it is not desired to infect by immunisation with a live vaccine.

Isolation, to do any good, does not mean relegation to oblivion and neglect ; such animals as are in isolation must be even more scrupulously looked after and sedulously cared for.

The fact that once a cow aborts she is likely to prove infected for an indefinite period (proved up to 7 years) points with no uncertain hand towards *vaccination* as the policy to pursue, especially in view of the encouraging results obtained. In the ordinary farm herd, whether kept for dairy purposes or stock-rearing, it represents the only practicable method of control, and seeing that the disease is widespread, so likewise should be the process of vaccination.

In the discussions upon this subject some fresh and important factors have come to light. The first is that it now appears to be quite a safe and feasible procedure to administer the Ministry of Agriculture's living vaccine to *young* animals, during the early stages of pregnancy. It does not, however, appear to be a safe thing to do in the case of older cows.

This is explained, not on the ground that the particular batch of vaccine may be dead, though I observe that the instructions and procedure now in force provide for the prompter administration of the vaccine than was formerly the case, but on the ground that by repeated and long standing sub-culture the virulence of the bacillus has become attenuated.

The dose (50 c.c.) is a colossal one and calls for a specially large syringe, those designed for hog cholera serum work being specially suitable, and the side of the neck I consider provides the most convenient site for injection, as there the subsequent swelling is least likely to prove an inconvenience. Vaccination presents a method whereby, in a comparatively short time, the same results as regards immunity may be obtained, as may be hoped for in several years, by the small quantity of infection obtained at intervals, from contaminated food and water, and at far less expense by eliminating abortions and consequent losses. It must be borne in mind, however, that in using the living product one is actually inducing an active infection that may persist indefinitely, and, once started, it appears to be advisable to continue vaccinating, as a routine procedure, applicable to every heifer or cow without exception, until two or three successive annual doses have been administered and the disease has subsided. Even then it may be advisable to continue vaccinating heifers before they are bulled, and fresh cows bought into the herd.

Research seems to show that a cow is immune to abortion only so long as she continues to harbour living abortion bacilli in her system, therefore the success of control by the vaccination method depends upon seeing to it that the whole of the breeding herd is infected, except the bull. After vaccination it is necessary to keep the heifer or cow away from the bull for a period, so that an active state of immunity may be established before pregnancy is brought about.

The period laid down is *two months*, but in the case of *older cows* some practitioners, who have used the vaccine very extensively in our leading dairy counties, are inclined to prescribe a period of *three months*.

Dead or Devitalized Vaccines.—Though such vaccines were not favourably reported upon in the findings of the Departmental Committee, they are put forward by their manufacturers as being effective, though to a less degree than the living culture, and being specially suitable for use in herds not already infected, and also for use in the case of animals where pregnancy is already established. Such immunity as is conferred by this method is stated to be of low degree and of short duration (on the pregnancy). V.R., 12th Feb., 1921, p. 144, Bureau of Health, Berlin.

Sterility.—I touch upon this point here as it has been stated that vaccination with the living *B. abortus* culture has appeared to cure heifers of sterility. Whether such is the case in cows brought into a state of sterility as a result of the complications succeeding abortion is another matter, but it is something to have observed a means of combating sterility in any form.

Legislation.

The Order of 1920—which was of a permissive and local character, but still potent enough for a fine of £20 to be inflicted—has been superseded by the *Epizootic Abortion Order of* 1921. The new Order is compulsory, definite, and more comprehensive in character, and has the advantage of being universally and not locally applicable, so that there is now no reason for competition between local authorities in making the Order a dead letter.

It is laid down that it is not lawful for any person to :—(1) expose in any market ; or (2) sell ; or (3) send for service to any bull ; or (4) turn out on common or unfenced land, etc., a cow or heifer which has calved prematurely within the preceding two months.

From a veterinary point of view the chief difficulty that presents itself is : On what grounds, clinical or otherwise, can a cow or heifer be certified to have calved prematurely within the preceding two months ?

For this purpose the agglutination test is not applicable, as it only discloses whether the animal is infected or not, and does not provide any criterion as to how long the animal has been infected. It seems, then, that the only means of ascertaining that a cow or heifer has aborted within a period of two months is the owner's integrity, and possibly, too, the curiosity or busybodiness of the neighbours may play a part.

As matters stand the law now enforces a period of two month's isolation for an aborter ; and it might perhaps even go further, in enforcing or recommending immunisation during that period.

Notifiability.—The question of making contagious abortion a notifiable disease has been raised, but at the present seems to have more weight against than for it. However, so far, the discussion upon the disease has not proceeded beyond the phase of its control ; if and when

it becomes a matter of eradicating contagious abortion the question of notifiability will inevitably seriously arise.

The PRESIDENT described the Epizootic Abortion Order as useless. How was the ordinary market inspector to determine that a cow had aborted within two months? A veterinary surgeon himself probably could not tell without a proper test. If it was the general opinion of the profession that the Order was not likely to lead to any good they should express that view publicly.

Mr. ASTON related his experience in testing pedigree herds. In one instance there occurred the first case of abortion since the herd was formed and the animal reacted. The remaining cows were tested and only one reacted to the first general test in addition to one that had stood next to the aborter. The affected cows were isolated as far as possible and the others housed in sheds with a special attendant, all precautions in regard to drainage, bedding and feeding being adopted. The tests were continued for nine months and offenders weeded out, seven tests in all being made. Considerable expense was incurred in endeavouring to stamp out the disease, and it appeared that satisfactory results could only be obtained if the first case was at once removed to an entirely separate farm. He had found the use of vaccine highly beneficial and had had no trouble with subsequent swellings. He would not vaccinate any herd, even a small one, without first submitting a blood test to the Board of Agriculture.

In answer to questions by Mr. Slipper, Mr. Aston stated that he used the vaccine supplied by the Board of Agriculture. The herds with which he was principally concerned were breeding herds in which the cows all calved about the same time of the year and when vaccination was resorted to it was deferred until they had all calved.

Mr. SLIPPER said his difficulty was that calving was spread over a considerable period and it was possible that if abortion occurred the expense of vaccinating the whole herd might be useless. The only thing to be done was to isolate the affected animal as far as possible.

Mr. H. W. DAWES said that in spite of the large amount of research work that had been and was being carried out, many important points were still obscure.

There were still a number of scientists who upheld Professor Williams' theories on the question of abortion, and in some isolated cases in the field one was inclined to look elsewhere than to the bacillus of Bang for the cause, although most of them were prepared to accept the greater percentage of cases as being of the contagious type.

Many stock owners to-day possessed quite a good knowledge of the subject of abortion and when a practitioner was asked whether or not he would recommend vaccination in particular instances he was frequently unable to answer the question with satisfaction. In a dairying district in particular where cows were calving down at all times throughout the year it was difficult to determine whether vaccination should be instituted or not, and if so whether the whole herd or part of it should receive attention.

A point which was of great interest was the regional distribution of the disease. In some districts contagious abortion was more rife than in others. Again, good sanitary conditions or bad did not seem to affect its incidence to a marked degree. He had in mind two large dairy farms: on the one where animals were kept under very good conditions the disease was very prevalent; on the other where the sanitary conditions were extremely bad and everything was favourable to the dissemination of the disease it was not a source of trouble.

The retention of the fœtal membranes was an important consideration in the study of the disease. There was a tendency now to delay manual removal for a few days. The question of irrigation of the womb in such cases was a vexed one; personally he had totally abandoned the practice of irrigation in favour of the use of pessaries.

Lastly, with regard to legislation; the Epizootic Abortion Order of 1921 was, undoubtedly, a step in the right direction, but its correct interpretation in practice was a matter of difficulty. It was a delicate question to determine whether or not a cow had aborted during a period of the preceding two months. A veterinary inspector who was asked to express an opinion on a cow exposed for sale as to whether abortion had occurred recently or not was placed in a very awkward position and one in which great divergence of opinion might arise. This appeared to him to be a weak point in the useful working of the order.

Mr. J. MARTIN said he was a strong advocate of the practice of irrigating the vagina with fairly strong solutions of corrosive sublimate. He had carried this out extensively and always with good results over a long period. With regard to the removal of fœtal membranes he was of the opinion that if they had to be removed by force rather than by gentle measures it was much better to defer the procedure for a few days. Forcible removal of the membranes was to be avoided. He was a great supporter of the use of pessaries after such procedure as opposed to the irrigation of the uterus with large quantities of antiseptic fluids.

Mr. CORMACK was of opinion that vaccination was highly beneficial in its results. The Board of Agriculture vaccine could be strongly recommended. He never advised vaccination, however, unless there was a regular and considerable percentage of cases of abortion on the premises. If an outbreak could be attacked at the very outset its spread could be prevented by the test and by isolation. There was the danger that once vaccination was adopted a step was taken that meant that in more or less degree the disease was kept alive. When there was a large number of cases of abortion on a farm the practitioner should recommend vaccination at least two months before the animals went to the bull. He did not favour early removal of the placenta unless it was loose. It was generally wise to give something in the nature of a cleansing drench for two or three days, when the removal would prove much easier. He only advocated irrigation of the uterus in exceptional cases. The liquid contents should be removed by means of a sponge, after which pessaries should be inserted.

Mr. TIPPER, observing that the Epizootic Abortion Order was made as a result of the clamour of the agricultural community, suggested that the veterinary medical profession should more closely ally itself with agricultural organisations in order that it might be in a position to point out the lines on which such regulations should be framed and the mistakes to be avoided.

Mr. DAYUS quoted a case of 15 Friesian heifers which were vaccinated two months before going to the bull and yet had great difficulty in calving.

Mr. L. C. MAGUIRE said as a result of personal observations not only in this country, but also in Ireland, Denmark and France, he disagreed with the orthodox view that contagious abortion was a disease caused by Bang's bacillus only. This organism he regarded simply as a contributory factor. He likewise was opposed to Professor Williams and the general American scheme in saying that after conception had taken place the uterus was hermetically sealed to outside infection and that infection from the circulation of a pregnant animal could not enter. Eminent gynæcologists had shown that in human beings smallpox, scarlet fever, measles, syphilis and typhoid fever and other diseases were transmitted to the fœtus *via* the blood stream and set up those diseases in it and that chemical agents of high diffusability were capable of a similar effect. In the great majority of cases of abortion Bang's bacillus was present, but it was only a cause by which the natural immunity of the uterus was lowered, thus allowing infection by other organisms, incurred either before or after conception, to become exalted in virulence and thereby bring about the morbid condition of the uterus, the fœtal membranes or fœtus itself, which were responsible for abortion. It was very common to find that expulsion of the embryo in the first few months of life was caused by an endometritis. In the early period of gestation, the fecundated ovum was sustained by what was called the uterine milk, and anything which destroyed the glands of the endometrium, which secreted this "uterine milk," brought about death of the ovum from

starvation. Other conrtibutory causes of death of the embryo were devitalisation of the ovum or spermatozoon before fecundation had taken place. The majority of people overlooked the fact that the male might be responsible for quite as much infection as the female. He did not approve of the agglutination test. Our present knowledge of the normal physiological power of bovine blood did not warrant the taking up of a position in which one could say whether infection was present or not. Several experiments had been made which proved that in many cases inoculating a pregnant bovine with a pure living culture of Bang's bacilli would not cause abortion. He wanted an explanation of that fact; his own theories in explanation were: (1) that the uterus at the time of inoculation with Bang's bacilli was free from infection by other organisms, that a pure uncomplicated infection with Bang's bacillus was unable to cause abortion; (2) that at time of inoculation the animal was already infected with Bang's bacillus, therefore did not react to the artificial introduction. As to the suggestion that the diseases might be infective to man, he contended there was not at present sufficient evidence to support this idea, except perhaps, that infections by Bang's bacillus might open the way for a secondary infection, which later might in some cases be pathogenic to man. He contended that in this manner Bang's bacillus was responsible for the great majority of cases of mammitis in this country. In the course of seven years' practice in the south, north and midlands of Ireland he never saw a case of contagious abortion except on one dairy farm. In that instance, the initial outbreak consisted of two cases, the owner then consulted him and without making any agglutination tests, which he had no faith in, he vaccinated the forty cows comprising the herd. That was six years ago and he did not think the trouble had been eradicated yet; the blame for this he attributed to the use of abortion vaccine. Referring to mammitis, why was it they did not get the same number of cases of this disease in sows, mares, sheep and goats as in cows? Abscesses were a common sequel to vaccination with Bang's organism, although this bacterium had very little, if any, pyogenic properties. Why, therefore, should abscess formation follow the use of this vaccine? He was convinced that inoculation with the vaccine used in this country was one of the greatest means of disseminating contagious abortion. They inoculated animals that might or might not have been previously infected and the bacilli remained in the systems for an indefinite period, in some instances as long as eight years. The only way to get rid of contagious abortion was to breed from clean parents, and in order to assure this there must be a systematic examination of the reproductive organs of both male and female before co-habitation is allowed. They might not be able to diagnose properly all the morbid conditions of those organs, but they could prevent breeding from those animals whose generative organs showed clinical morbid lesions.

Reply to Discussion by Mr. Tudor Hughes.

It was, of course, said Mr. Hughes, the most satisfactory and scientific procedure to confirm one's diagnosis by the agglutination test before resorting to vaccination. However, when one came across an outbreak of the disease characterised by a sequence of abortions, the clinical evidence offered such unequivocal proof that there appeared to be no risk in adopting vaccination forthwith.

Unless ideal conditions were available Mr. Aston's experience seemed to emphasise the view that control by isolation methods was hardly worth the expense, and suspense, involved.

"What is to be done with regard to the mixed position of the average dairyman's herd? The newly-calved or freshly aborted cows are, of course, eligible for treatment with the living vaccine, and it is stated that young and strong cows will tolerate the vaccine now being issued by the Ministry of Agriculture, even though they may be in the very early stages of pregnancy. Those animals about half gone might be protected by means of killed or devitalised vaccines. For those approaching full term a policy of non-interference is best.

With reference to advising one's client and the enlightened attitude of dairy farmers, I find that the latter, often men who have had an agricultural college training, are the keenest on adopting vaccination.

Regarding the agglutination test, it is purely a laboratory process and though not absolutely infallible, provides the strongest positive evidence of infection as yet known. Information as to the regional distribution of contagious abortion would be highly interesting, if available, and as there is a big trade done in the Midlands in Irish cattle it was a pity the discussion of the Irish Branch was not published. (The discussion to which Mr. Hughes refers has since been published, viz., in the *Record* for March 11th.—Ed.) Irrigation of the womb is a vexed question on which widely divergent opinions are expressed. In my opinion no hard and fast rule is applicable, each case having to be dealt with according to the conditions prevailing.

Mr. McCormack succinctly sums up the position regarding both vaccination and transmissibility when he says that it does not matter whether cows are infected by the *B. abortus* or not, so long as they do not abort."

This was a disease that presented considerable difficulty from the standpoint of legislation. The 1921 Order was undoubtedly a great advance upon its predecessor, but in the last resort the proof of abortion having occurred within a period of two months appeared to depend on the evidence of the person who witnessed the act.

There were constantly laws being passed that had to come before a court of law for interpretation by means of what were usually called "test" cases, and perhaps they would have to await such a case before the applicability of the present Order was fully realised.

"I certainly agree," continued Mr. Hughes, "that it is desirable that the profession should be more closely in touch with the agricultural industry with the object of ensuring such orders being framed so as to be protective in their action and practicable in their application. Tim e presses, and the wide survey of Capt. Maguire can scarcel y be touched upon. The view that the *B. abortus* of Bang acts catalytically rather than directly is certainly interesting, but opposed to the accepted experimental evidence.

Experimental evidence supports the view that a cow is a "carrier" so long as she continues to give a positive reaction to the agglutination test. The association of sterility with vaccination in the case cited for the lack of more widespread evidence, is probably ascribable to coincidence rather than to a cause and effect relationship."

On the motion of the President, seconded by Mr. Robinson, Mr. Hughes was cordially thanked for his paper.

(*To be concluded next week.*)

Notes and News.

Foot-and-Mouth Disease.

Departmental Committee Appointed.

The Minister of Agriculture and Fisheries has appointed a Departmental Committee "to inquire into the origin and circumstances of the recent outbreak of foot-and-mouth disease and into the policy and procedure which was pursued in dealing with the disease, and to report whether any alteration of the methods of administrative control hitherto adopted or any amendment of the existing law is necessary or desirable."

The Committee is constituted as follows :—
Capt. the Rt. Hon. E. G. Pretyman, M.P. (*Chairman*).
A. Batchelor, Esq.
David Ferrie, Esq.
F. W. Garnett, Esq., C.B.E., J.P.
H. German, Esq.
William Graham, Esq., J.P., D.L.
Alfred Mansell, Esq.
Sir G. Douglas Newton, K.B.E., M.P.
Professor John Penberthy, J.P.
W. R. Smith, Esq., M.P.

The Secretary of the Committee is Mr. S. A. Piggott, Ministry of Agriculture and Fisheries, 4 Whitehall Place, S.W.1, to whom all communications should be addressed.

REMARKABLE STORY FROM NOTTINGHAM.

A remarkable statement as to the ill-treatment of cattle suffering from foot-and-mouth disease was made at a meeting of the Notts Farmers' Union at Nottingham. A member submitted a report by a Thrumpton farmer alleging that, on Tuesday of the previous week, he suspected a case of foot-and-mouth disease among 20 of his beasts on Trent side. The authorities were unable to examine the animals on that day, but the disease was certified the next day, as well as another case in the same herd. The farmer asked if he would be allowed to keep the unaffected beasts, but the authorities were unable to give a definite answer until the following day, when he was informed that all the cattle would be slaughtered. They were accordingly valued, but no further proceedings to prevent the disease spreading were taken beyond visits from various officials during Thursday, when it was reported that there were nine cases in all. Slaughtering commenced on Friday morning, and in the course of the day some of the animals broke loose, and became so wild that they could not be penned again. Shot guns were then used, and the animals broke through into adjoining fields. One animal, wounded in the eye, swam the river Trent, and was still lying wounded on the far side of the river at mid-day on Saturday. Four shots were fired at the beast.

The members expressed great indignation, and the Secretary was instructed to communicate with the headquarters of the Union with a view to the matter being reported to the Ministry of Agriculture.

With reference to the above allegations, a representative of the *Nottingham Journal* interviewed Captain Croker Fox, the representative of the Ministry of Agriculture for the area.

He declared emphatically that the animal had not lain wounded during the night as had been stated.

Captain Fox said : "The animals were being slaughtered in a 70-acre field, in which a corral had been improvised, and according to the regulations of the Board the operation was being carried out by means of the humane killer.

"This method has been proved to be the most efficient and expeditious, and, in addition, was carried out by a man who has had considerable previous experience in this work, and this has always been done satisfactorily.

"A number of the animals had been killed, when the remainder suddenly broke through the corral. On Saturday morning the butcher borrowed a gun, and after shooting dead three or four of them he wounded one. This beast made for the river Trent, which adjoins the field, and swam to the Long Eaton side.

"I was in Leicester at the time, and was communicated with by telephone. I at once sent Mr. Westgate, the veterinary inspector, who, on that information, proceeded to the Long Eaton side of the river and found that the animal had swum back again.

"As there was no means of getting across, and deeming it advisable to obtain further assistance, he telephoned to me, and I at once set out for the scene in a motor-car.

"Arriving there I found the wounded animal under a hedge. It endeavoured to again make for the river, but I headed it off and ultimately it was driven back to a corral, where I shot it and three others, using only one cartridge to each.

"The animal was wounded on Saturday morning, and I shot it at five o'clock in the afternoon.

"There is absolutely no truth in the statement that it was lying wounded all night.

"I am of opinion that a mistake was made in not having a sufficiently strong corral."

The Diseases of Animals Bill was read a second time in the House of Commons on March 30th.

Anthrax in Wool.

INQUIRY INTO PROBLEM OF DISINFECTION.

The Ministry of Labour announces that, as a result of the proceedings of the third general conference of the International Labour Organization and of the last session of the governing body of the International Labour Office, an Advisory Committee has been appointed by the Office for the purpose of inquiring into :—

(*a*) The problem of the disinfection of wool and hair infected with anthrax spores in all its bearings, and to report thereon to the governing body in time for consideration by the 1923 Conference.

(*b*) The practice and effective methods of preventing infection among flocks ; and to report thereon to the 1923 Conference.

(*c*) The possibilities of dealing with infection by anthrax from hides, skins, and other materials.

The British Government has nominated Sir William Middlebrook, M.P., as chairman. He was chairman of the Departmental Committee on the Prevention of Anthrax which was appointed in 1913.—*The Times.*

The Pasteur Centenary.

In order to commemorate the centenary of the birth of Pasteur, the University and the town of Strasbourg, with the concurrence of the Pasteur Institute, and the approval of the family of Pasteur, have proposed to erect a statue facing the Strasbourg University, where, as a professor, Pasteur commenced his career. The inauguration ceremonies will take place on May 1st, 1923, under the patronage of M. A. Millerand (President of the Republic), M. le Président A. Loubet, M. R. Poincairé, M. Loredu, and M. Alapetite, and will include the unveiling of the statue and the opening of an Exhibition of Hygiene and Bacteriology. The exhibition will be designed to illustrate the advances made in various branches of science as the result of Pasteur's discoveries, and at the same time a Congress of Hygiene and Bacteriology will be held for the discussion of questions relating to the prevention of disease. With the object of showing the sympathy of this country with the projects of the French Committee, a British Committee composed of the following members has been formed :—Sir Charles Sherrington, G.B.E., President of the Royal Society (Chairman) ; Mr. A. Chaston Chapman, F.R.S., President of the Institute of Chemistry of Great Britain and Ireland (Treasurer) ; Mr. H. E. Field, President of the Institute of Brewing ; Prof. Percy F. Frankland, C.B.E., F.R.S., Emeritus Professor of Chemistry, University of Birmingham ; Sir John McFadyean, M.R.C.V.S., LL.D., Principal of the Royal Veterinary College ; Prof. C. J. Martin, C.M.G., F.R.S., Director of the Lister Institute ; Sir W. J. Pope, K.B.E., F.R.S., Professor of Chemistry, University of Cambridge ; Sir James Walker, F.R.S.,

President of the Chemical Society; Sir Almroth Wright, K.B.E., F.R.S., Principal of the Institute of Pathology and Research, St. Mary's Hospital. It is hoped that those who desire to contribute to the memorial will send their contributions to the General Secretary and Treasurer, Monsieur Th. Héring, 6 rue des Veaux, Strasbourg, or to Mr. A. Chaston Chapman, F.R.S., The Institute of Chemistry, 30 Russell Square, London, W.C.1. The Commissioner-General, Professor Borrel, is very anxious to be furnished with the names of manufacturers and business firms in this country to whom the exhibition might be of especial interest. All who can assist are requested to communicate with Professor Borrel, 3 rue Koeberlé, Strasbourg.

Fee Protest at Assizes.

At the close of the business at Glamorgan Assizes at Cardiff, on Monday, March 20th, Mr. Reginald W. Hall, veterinary surgeon, of Tynewydd Road, Barry, who earlier in the day had given expert evidence in a Barry Dock case, made an application to his lordship with regard to his fee, which, he said, was inadequate, having regard to the nature of his evidence, and that he should have been placed on the same footing as a medical man.

His Lordship said he was sorry he could not deal with the matter at that stage, the business of the Assizes having been completed. The protest ought to have been made at the conclusion of the case in which Mr. Hall was concerned as a witness.—*Western Mail.*

End of Worn-Out Horse Traffic.

Mr. Aubrey Herbert, having asked in the House if a scheme can be devised prohibiting the export of worn-out horses for slaughter, Sir A. Griffith-Boscawen has replied: "Only those horses which are in good working condition are allowed to be exported. The elimination of the unfit or worn-out horse has already been attained, and there would be no justifcation for interfering with the export of such horses as are now being shipped on the ground that they may ultimately be slaughtered for food."

Sir John Butcher asked for the terms of the agreement between the Government and the Belgian and Dutch Governments as to slaughter on this side of horses intended to be sent abroad as food.

Sir A. Griffith-Boscawen: The Belgian and Dutch Governments have agreed not to put obstacles in the way of the importation of horseflesh, and a considerable increase in this trade has recently taken place.

It would be impracticable to make a definite agreement to prevent the slaughter in Belgium or Holland of any horses exported from this country.

Sir John Butcher asked whether the Minister's attention had been called to statements publicly made by Miss Cole, of the R.S.P.C.A., to the effect that the Mersey, from Goole, reached Antwerp on January 24th last with one horse dead, one so injured that it had to be killed at the dock, and one that had to be conveyed to the slaughter-house on a float; that on another line from Leith last year an average of one horse in each 100 reached Antwerp dead or fatally injured; and what arrangements were made for inspection of the accommodation, feeding and watering of horses on board ship or on arrival abroad.

Sir A. Griffith Boscawen: Out of 623 horses shipped from Leith to Antwerp last year there were eight casualties, all of which occurred before the system of inspection was re-organised.

A new order was issued on December 21st last, the requirements of which have to be complied with at an early date.

By this order a daily ration is prescribed for every horse carried, together with a surplus for emergencies. Inspectors of the Ministry go on board and see that this is provided. Horses are also required to be watered before being shipped. A superintending inspector of the Ministry frequently meets the vessels on arrival on the Continent, and he has reported to me that adequate provision is made for feeding and watering the animals on disembarkation.

Sir J. Butcher asked if facilities were given for our inspectors to see if the arrangements made for the horses abroad were satisfactory.

The Minister believed so. He had the fullest reports from our inspectors as to the arrangements.

Replying to a further question, the Minister said he had no control over the matters relating to the slaughtering of horses abroad. [He could do nothing but make representations on the subject.

The Gaunt Spectre.

[We give this letter, says the *Liverpool Echo*, from a correspondent known to us, as received.]

It must always be that one half the world does not know how the other half lives, but let us not shun the knowledge. Sheltering within the doorway of a building in Moorfields, in mid-afternoon on a day last week, when fierce winds and driving rain held the mastery, the writer exchanged a few words with a fellow-shelterer, unquestionably a gentleman. Discussing the bad trade conditions, the stranger remarked that he had been out of employment for four months and, being an ex-officer, was not eligible for the "dole."

And then his story came out, somewhat reluctantly—a pathetic one indeed. He was a "vet.," and had army rank of major, but motors had ruined his profession, and constant failure forced him to try the docks for work. All his allowances had ceased. That day he had been within an ace of getting a job as a fitter's labourer, but his speech betrayed him; his education was the bar to his selection. In spite of this terrible disappointment, an ordinary fellow marvels that he showed no bitterness of spirit, nor did he even make use of strong language.

Upon the remark being made that time must hang heavily with him, he stated that he goes at 6 a.m. to the docks, staying away from his wife and three children all day because he could not take a share of the little they had. On his return in the evening he makes his wife believe that he has had his fill, though he stated the fact that he had not had a cup of tea since breakfast the previous day. He was at the time pulling hard at a cigarette, not having had one for many days. I was staggered at the knowledge. Here stood an educated man, wonderfully bright and cheerful, with a smart and well-dressed appearance, smiling bravely while he starved for his wife and little ones in our wealthy city.

When a suggestion of a little help was made, he declared that he had not a copper, and gratefully expressing his thanks hurried away to a cup of tea.

What dire domestic tragedy may hide beneath a brave smile, or "rude anguish" exist within a smart and trim appearance.—T. M.

Li'l Mr. Sepsis.

When the surgeon to the theatre goes with solemn steps, and slow,
And a doubtful diagnosis on his mind,
And the nurses with the instruments start dashing to and fro,
Comes à li'l feller sneakin' in behind.
But the staff are full of hurry, and as up and down they scurry
(For the surgeon is a hasty man and firm),
Little chap to climb is able, unobserved, upon the table;
He's a germ! Oh, Mr. Burgess!! He's a germ!!!

When the surgeon with precaution scrubs his fingers or his nails,
'Cos li'l Mr. Sepsis well he knows,
Wraps a gown around his body, and his face and neck he veils,
In case he's got a coccus on his clothes;
When the sister, wan and tired-eyed, swabs the whole world with biniodide,
You'd think the little feller wouldn't dare
To attend the operation, in his fear and trepidation;
But he's there! Oh, Mr. Burgess!! He is there!!!

When the surgeon gets a'busy with his victim for a time
(And incident'ly isn't pleased to find
That he's diagnosed him wrongly) does a Pirigoff or Syme ;
He keeps a'glancing warily behind.
And when everyone supposes the most perfect of prognosis,
With the sutures in, and bleeding points all tied,
Then up pipes the little rebel, in a shrill triumphant treble,
"I'm inside ! Oh, Mr. Burgess ! ! I'm inside ! ! ! "
—H. W., *in the Manchester University Magazine.*

Correspondence.

Letters to the Editor should reach the Office not later than by the first post on Tuesday morning for insertion in following Saturday's issue.
All correspondence must bear the name and address of the contributor for publication.
The Editor does not hold himself responsible for the opinions of his correspondents.

Etiology of Fistulous Withers and Poll Evil.

Sir,—In the *Veterinary Record* of 1st April, Mr. W. R. Davis discusses the above subject, and enquires whether animals employed in mines are particularly liable to fistulous withers and poll evil. I have had charge of over 1,000 horses and ponies for two years, during which time there has been one case of fistulous withers. In the course of about ten years' experience of mining practice this is the only instance which I can recall in which the condition has occurred in an animal employed underground. The animals wear special skull caps when working, and these afford some protection to the poll, but there is no protection for the withers.—Yours faithfully, J. R. RIDER, M.R.C.V.S., Ivycroft, Carmel Road, Darlington.
April 3rd, 1922.

Humane Slaughtering, Etc.

Sir,—Why do some secretaries of Societies and Trade Unions go outside their functions in discussing legal matters or points *sub judice* and advising people and commenting thereon ? Their opinions are frequently neither judicial, well informed, nor fairly reasoned, but often simply biassed statements from their point of view or that of the Society or Union they represent. Sensible men will not be led astray by them and "the needless suffering" and "the Ministry of Health action" will not depend or be influenced by the *ipse dixit* of any secretary, however previous his ideas may be. To me it seems that lawyers are the best men to advise on legal matters and men who have studied and worked among animals and their diseases all their lives the best men to decide on temperamental, physiological and anatomical matters in animals.—Yours truly, G. MAYALL, M.R.C.V.S., 88 St. George's Road, Bolton.
April 1st, 1922.

Army Veterinary Service.

LONDON GAZETTE. WAR OFFICE. REGULAR FORCES.

March 31st.—T./Qrmr. and Capt. S. Rogers relinquishes his command on completion of service, and retains his rank (December 25th, 1919).

April 3rd.—Capt. E. C. Doyle, D.S.O., retires, receiving a gratuity (April 4th), and is granted the rank of Major ; Major A. Leaning, D.S.O., to be acting Lt.-Col. while holding the appointment of A.D.V.S. (February 17th).

Diseases of Animals Acts, 1894 to 1914. Summary of Returns.

Period.	Rabies. Cases Confirmed. Dogs.	Rabies. Cases Confirmed. Other Animals.	Anthrax. Outbreaks confirmed.	Anthrax. Animals attacked.	Foot-and-Mouth Disease. Outbreaks confirmed.	Foot-and-Mouth Disease. Animals slaught'd as diseased or exposed to infection.	Glanders (including Farcy).* Outbreaks reported by the Local Authorities.	Glanders (including Farcy).* Animals attacked.	Parasitic Mange. Outbreaks reported by the Local Authorities.	Parasitic Mange. Animals attacked.	Sheep Scab. Outbreaks reported by the Local Authorities.	Swine Fever. Outbreaks confirmed.	Swine Fever. Swine slaughtered as diseased or exposed to infection
GT. BRITAIN.	No.	No.	No.	No.	No.	No.	No.	No	No.	No.	No.	No.	No.
Week ended 25th March, 1922	...	...	10	10	17	1015	...	...	29	34	11	17	6
Corresponding Week in 1921	1	...	13	13	...	...	...	...	49	66	9	15	8
Corresponding Week in 1920	...	...	15	15	...	...	...	...	109	177	11	38	11
Corresponding Week in 1919	2	...	5	5	...	...	...	...	131	247	4	19	5
Total for 12 weeks, 1922 ...	...	...	147	162	1045	49112	...	...	499	758	358	289	101
Corresponding period in 1921	16	1	170	196	24	2326	2	5	971	1549	312	254	65
Corresponding period in 1920	3	...	119	148	39	2001	9	16	1717	3104	243	514	182
Corresponding period in 1919	24	2	48	66	19	1033	1	1	1976	39·7	181	257	89
IRELAND.									Outbreaks				
Week ended 25th March, 1922	...	...	...	...	...	...	...	...	...	5	...	16	
Corresponding Week in 1921	...	...	...	...	...	...	...	...	1	3	...	2	
Corresponding Week in 1920	...	...	...	...	...	...	...	...	1	1	...	...	
Corresponding Week in 1919	...	...	...	...	...	...	...	...	3	4	1	...	
Total for 12 weeks, 1922	...	...	...	...	...	...	...	...	44	76	62	384	
Corresponding period in 1921	...	...	...	...	2	41	...	...	30	109	17	124	
Corresponding period in 1920	...	...	...	...	...	...	1	3	48	105	2	4	
Corresponding period in 1919	...	...	...	...	...	...	1	1	41	107	14	47	

NOTE.—The figures for the current year are approximate only. *Excluding outbreaks in Army horses.

NOTE.—The figures for the current year are approximate only.

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